California Environmental Protection Agency
Department of Pesticide Regulation

# Volatile Organic Compound Regulations

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## Overview

- Background
- Emission inventory
- Fumigant VOC regulations
- VOC lawsuit and regulation changes
- Related issues

# Air pollution

- Volatile organic compounds (VOCs) and nitrogen oxides (NOx) react with sunlight to form ozone, a major air pollutant
- Many pesticide active and inert ingredients are VOCs
- 1994 State Implementation Plan (SIP) to achieve ozone standard requires DPR to
  - Develop and maintain an emission inventory to track pesticide VOC emissions
  - Reduce emissions up to 20% from base year in five nonattainment areas (May-Oct peak ozone season)

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# Pesticide contribution to VOC inventory (2006)

| Nonattainment Area | Rank |
|---|---|
| Sacramento Metro | 15th |
| San Joaquin Valley | 6th |
| Southeast Desert | 16th |
| South Coast | 26th |
| Ventura | 3rd |

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## Major Sources of VOCs (San Joaquin Valley, 2006)

| Category | % of Emissions |
|---|---|
| Passenger vehicles | 14 |
| Other (waste disposal/composting) | 13 |
| Livestock waste (dairy cattle) | 9 |
| Oil and gas production (evaporative losses) | 6 |
| Consumer products | 5 |
| **Pesticides** | **5** |
| Heavy duty diesel trucks | 4 |
| Food and ag (crop processing and wineries) | 4 |

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## Pesticide VOC emission inventory

- DPR estimates VOC emissions from agricultural and commercial structural pesticide applications
- ARB estimates VOC emissions from other sources (including pesticidal consumer products)
- DPR calculates emissions for each year beginning with 1990, and updates annually based on most recent data

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# Method for estimating pesticide VOCs

- VOC emission from a pesticide product is calculated by multiplying:
  - Amount of product applied (from pesticide use reports)
  - VOC fraction in product (emission potential, EP)
- Fumigants are adjusted by an additional factor to account for emissions under field conditions
  - Emission rating varies with fumigant and application method
- Inventory focuses on:
  - May – Oct (peak ozone period) for each year
  - 5 nonattainment areas

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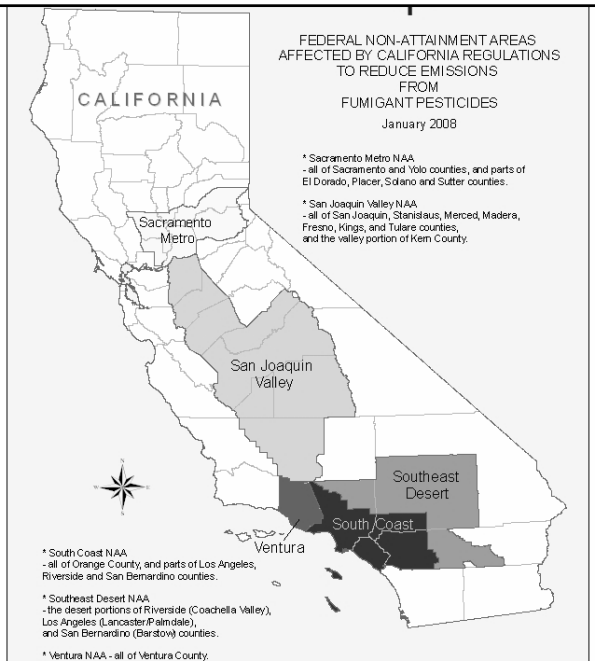


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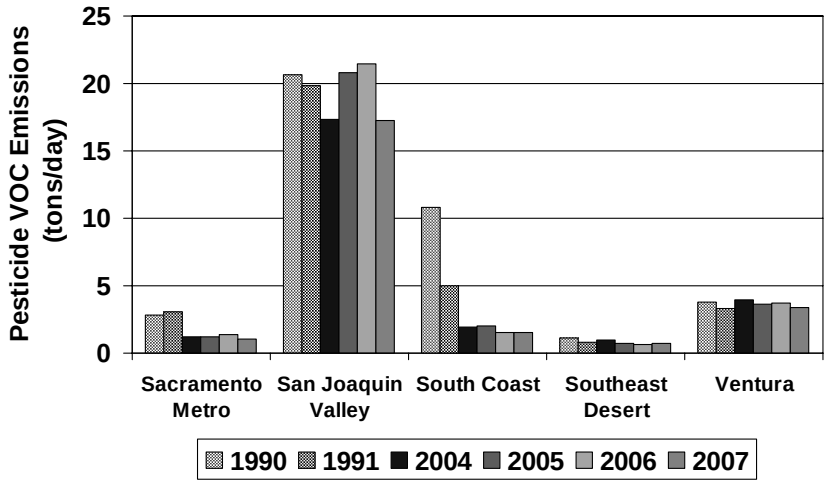
# Pesticide VOC emission estimates (May-Oct)

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# Pesticide VOC emission trends

- 2007 emissions in Sacramento Metro and South Coast remain well in compliance
- 2007 emissions in San Joaquin Valley, Southeast Desert, Ventura less than 2004, but remain out of compliance
- Fumigants and emulsifiable concentrates contribute the majority of pesticide VOC emissions

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# VOC lawsuit

- Several environmental groups sued DPR for not complying with SIP requirements
- Federal district court ordered DPR to adopt regulations
  - 20% VOC reduction in 5 NAAs, relative to base year
  - 1991 base year
  - DPR implemented fumigant regulations in Jan 2008
- San Joaquin Valley, Southeast Desert, Ventura do not comply with district court order

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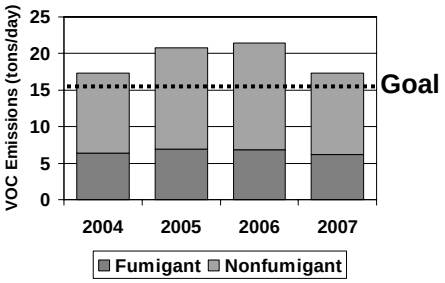
# Pesticide VOC inventory for San Joaquin Valley (May-Oct)

- Top active ingredients (% of 2007 pesticide emissions)
  - Chlorpyrifos (13.1%)
  - 1,3-dichloropropene (12.6%)
  - Metam-sodium (12.1%)
  - Methyl bromide (5.8%)
  - Oxyfluorfen (5.5%)
- Top application sites
  - Carrot (15.9%)
  - Almond (15.8%)
  - Grape (5.6%)
  - Orange (5.3%)
  - Nursery-outdoor (4.3%)

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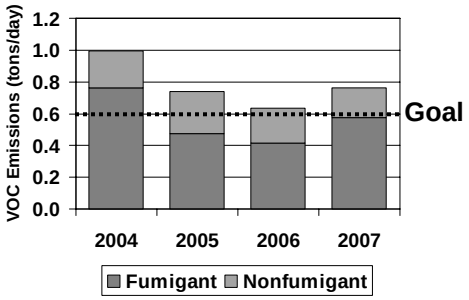
# Pesticide VOC inventory for Southeast Desert (May-Oct)

- Top active ingredients (% of 2007 pesticide emissions)
  - Metam-sodium (42.3%)
  - Methyl bromide (22.2%)
  - 1,3-dichloropropene (4.7%)
  - Permethrin (2.7%)
  - Bensulide (2.1%)
- Top application sites
  - Pepper (24.4%)
  - Turf/sod (16.2%)
  - Strawberry (14.4%)
  - Potato (9.5%)
  - Uncultivated (6.5%)

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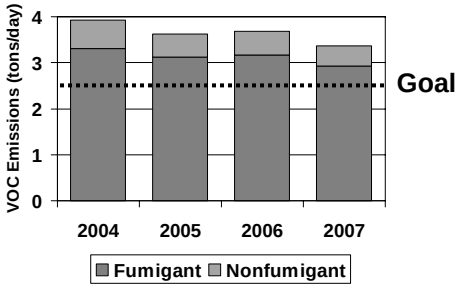
# Pesticide VOC inventory for Ventura (May-Oct)

- Top active ingredients (% of 2007 pesticide emissions)
  - Chloropicrin (37.3%)
  - Methyl bromide (27.8%)
  - 1,3-dichloropropene (20.0%)
  - Metam-sodium (2.1%)
  - Chlorpyrifos (1.3%)
- Top application sites
  - Strawberry (56.3%)
  - Soil fumigation (38.1%)
  - Lemon (1.7%)
  - Tomato (1.1%)
  - Raspberry (0.6%)

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## Fumigant VOC regulations

- Requirements for field fumigants, mostly during May-Oct
- Implemented regulations in Jan 2008 to achieve 20% VOC reduction from 1991, as ordered by federal district court
  - Licensing requirement for qualified applicators
  - Reporting requirements
  - Fumigation method restrictions
  - Fumigant limits and allowances – if emission threshold exceeded

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## Licensing requirements

- Statewide requirement
- New licensing sub-category for fumigation
- Qualified applicators who supervise fumigations must be certified in fumigation sub-category
- Effective 1/1/09
- Process to “grandfather” most current licensees
- No new requirements for private applicators

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## Records and reporting requirements

- Revise pesticide use report (PUR) to include 4-digit fumigation method code
  - Begins 2009
  - 5 NAAs only
  - All year
- Interim reporting system for 2008
  - County agricultural commissioner (CAC) follows normal process
  - Applicators send additional copy of fumigant PURs directly to DPR
  - Fumigation method code written on PUR sent to DPR

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## Field fumigation methods

- VOC emissions vary with fumigation method
  - Emissions can be reduced by changing methods
  - Emission rating assigned to 30+ fumigant-method combinations, based on monitoring data
- "Low-emission" method must be used May-Oct in
  - San Joaquin Valley
  - Southeast Desert
  - Ventura
- Most low-emission fumigation methods require
  - Tarp, or
  - Water treatments, or
  - Drip chemigation

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## Fumigant limits and allowances

- Regulation establishes May-Oct total pesticide (fumigant + non-fumigant) VOC benchmarks
- Limit on fumigant emissions if total pesticide emissions exceed 80% of benchmark
  - Fumigant limits updated each year, based on most recent data for fumigants and non-fumigants
  - Fumigant limits enforced by issuing emission allowances to growers
- Fumigant allowances in Ventura for May-Oct 2008

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## VOC legal issues

- Federal district court ordered DPR to adopt regulations
  - 20% VOC reduction in 5 NAAs, relative to base year
  - 1991 base year
  - DPR implemented fumigant regulations in Jan 2008
- Appeals court overturned decision in Aug 2008
- SIP commitments remain in effect
  - 12% VOC reduction in SJV, 20% reduction other NAAs
  - 1990 base year

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# VOC regulation revisions

- VOC 2 regulation
  - Implemented in Sep 2008, after appeals court decision
  - Phase in pesticide VOC reductions for Ventura over 5 years
- VOC 3 regulation (proposed)
  - Revise VOC 1 regulation benchmarks
    - Change base year from 1991 to 1990
    - Change SJV reduction from 20% to 12%
  - Delay fumigant allowances until 2011, except Ventura
  - Public comment period Nov 28 – Jan 15

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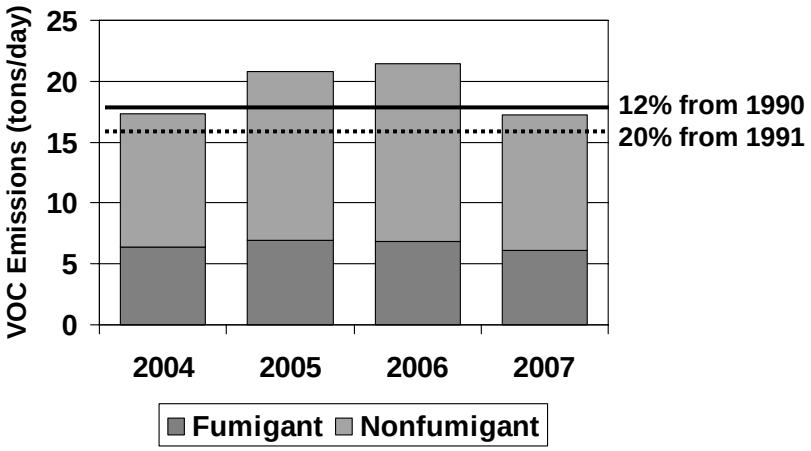
# Pesticide VOC inventory for San Joaquin Valley and reduction goals

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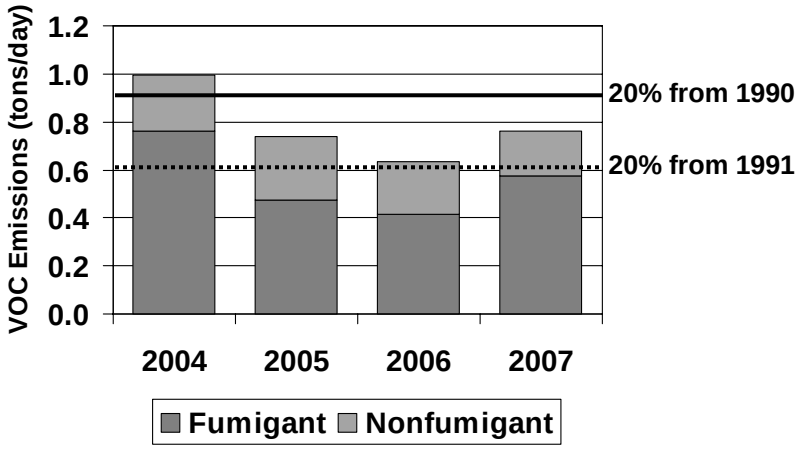
## Pesticide VOC inventory for Southeast Desert and reduction goals

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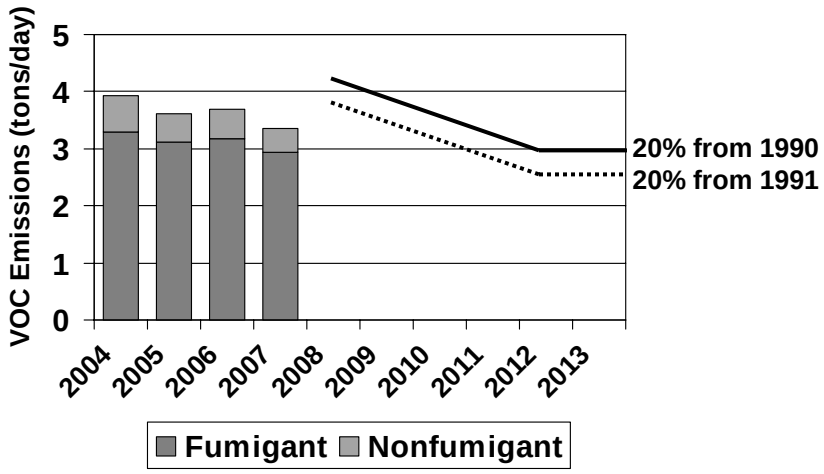
## Pesticide VOC inventory for Ventura and reduction goals

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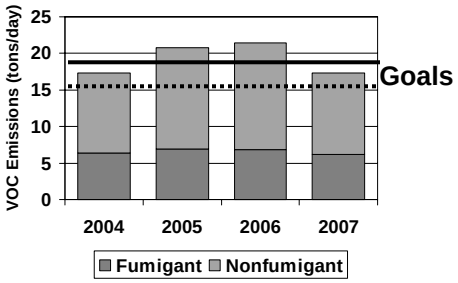
# Nonfumigant VOC emissions

- DPR considering actions to reduce nonfumigant pesticide VOC emissions from SJV top contributors
  - Chlorpyrifos (Lorsban)
  - Oxyfluorfen (Goal)
  - Gibberellins
  - Dimethoate (Cygon)
  - Abamectin (Agri-Mek)
  - Acrolein (Magnacide)
  - Trifluralin (Treflan)
  - Permethrin

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# Other VOC activities

- Increase inventory accuracy
  - Reactivity
  - Bayer lab method in development
- Research
  - New fumigation methods
  - Reformulated products
  - Application technology

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## Related regulatory activities

- U.S. Environmental Protection Agency
  - VOC exemptions
  - Fumigant exposure mitigation, label changes
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  - MITC exposure mitigation
  - Possible methyl bromide regulation changes
  - Possible 1,3-D township cap changes
  - Possible registration of new fumigants
  - Reformulation of certain high-VOC products

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## Voluntary fumigant reduction measures

- Change to lower emission fumigation method
  - Water treatments
  - Tarps
  - Drip chemigation
- Reduce application rate
- Reduce fumigated acreage
- Shift fumigations outside May-Oct

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## Voluntary nonfumigant reduction measures

- Change to lower VOC product
  - Water-based formulation
  - Solid formulation
- Greater adoption of IPM, organic practices
- Reduce application rate
- Reduce treated acreage
- Shift applications outside May-Oct

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## Grower assistance

- DPR preparing guidance document of practices that reduce VOCs, under U.S. EPA grant
- USDA – Environmental Quality Incentives Program
  - Matching funds to assist with cost of pesticide VOC reduction practices
  - DPR and USDA developing list of eligible practices

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## Key points

- Fumigants and emulsifiable concentrates contribute most pesticide VOCs
- Pesticide VOC reductions required in San Joaquin Valley, Southeast Desert, Ventura
- Reductions required during May-Oct
- Use fumigation methods with lower emissions
- Use non-EC formulations

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## Additional information

- For more information
  - www.cdpr.ca.gov
  - Click on “Air” under Quick Finder
  - Link to “Volatile Organic Compounds”

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